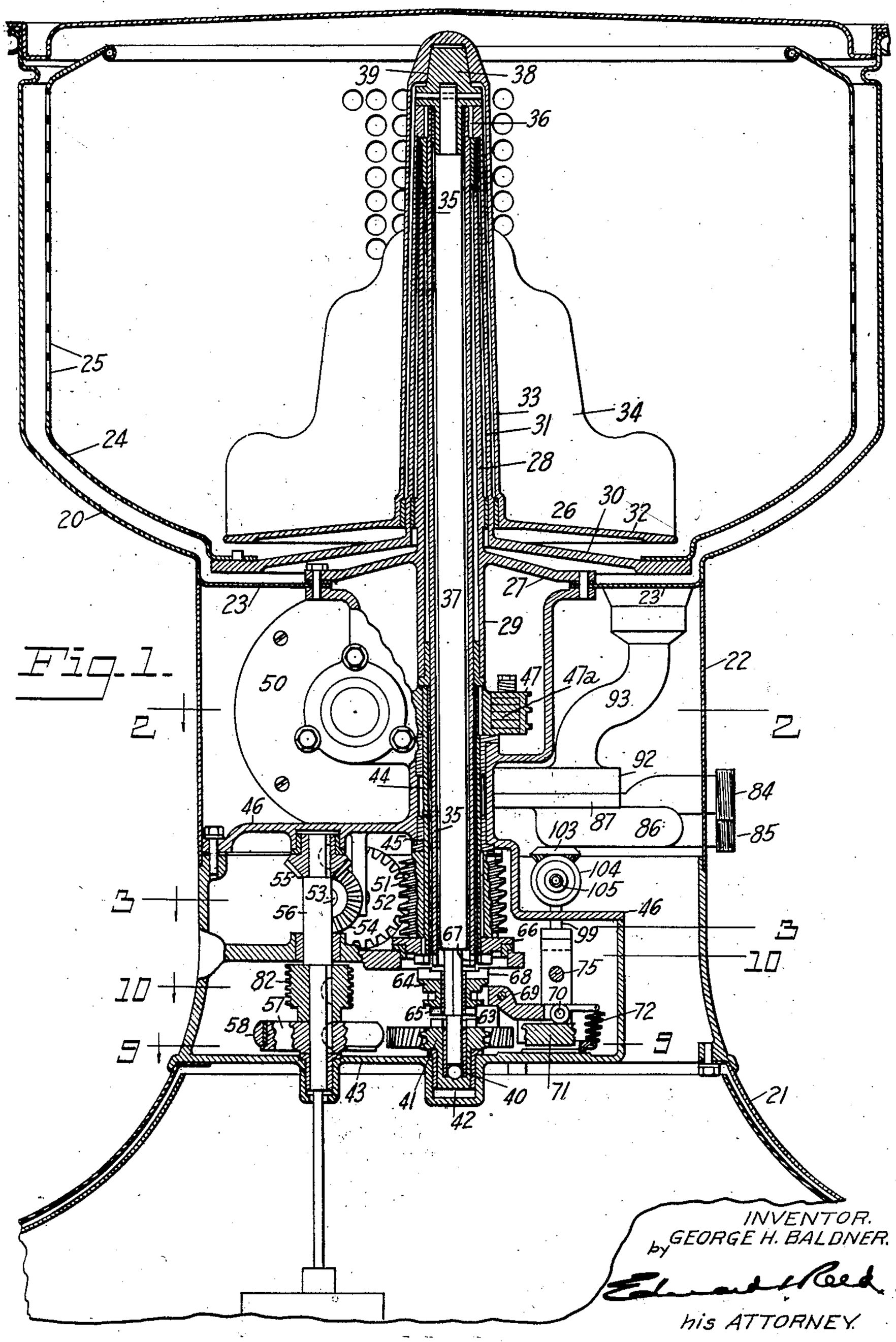
Feb. 14, 1933. G. H. BALDNER 1,897,414

CLOTHES WASHING MACHINE

Filed Nov. 11, 1931 3 Sheets-Sheet 1

Fig. 1.



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CLOTHES WASHING MACHINE

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Fig. 2.

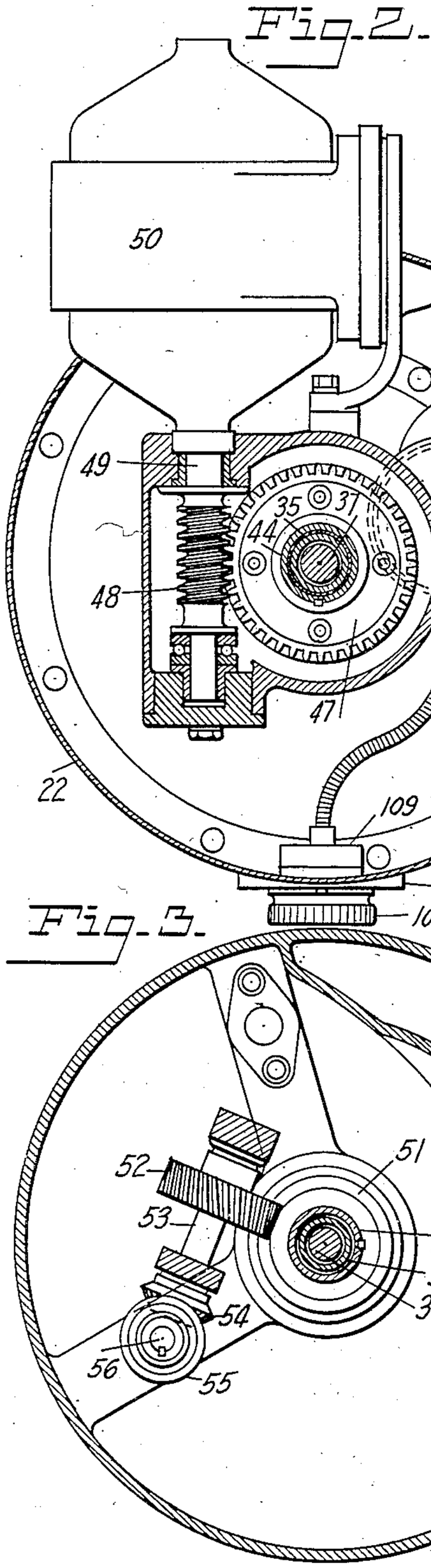

Fig. 3.

Fig. 4.

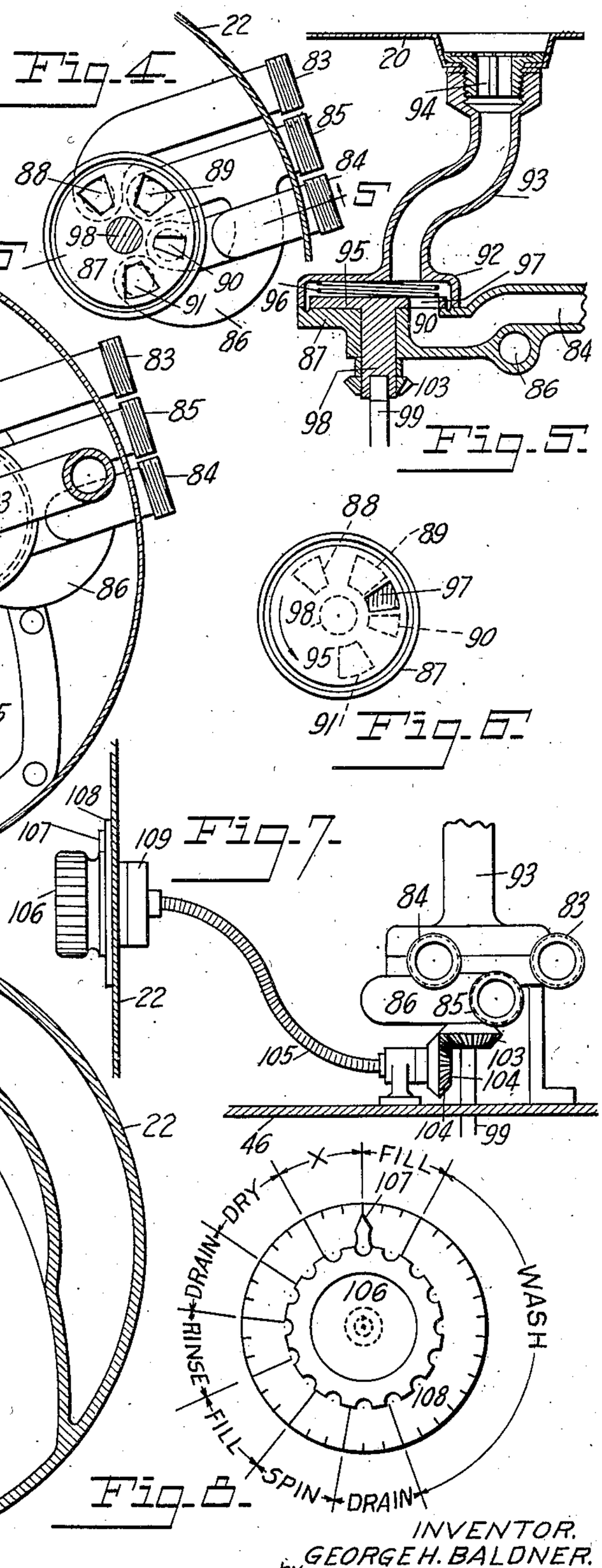

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

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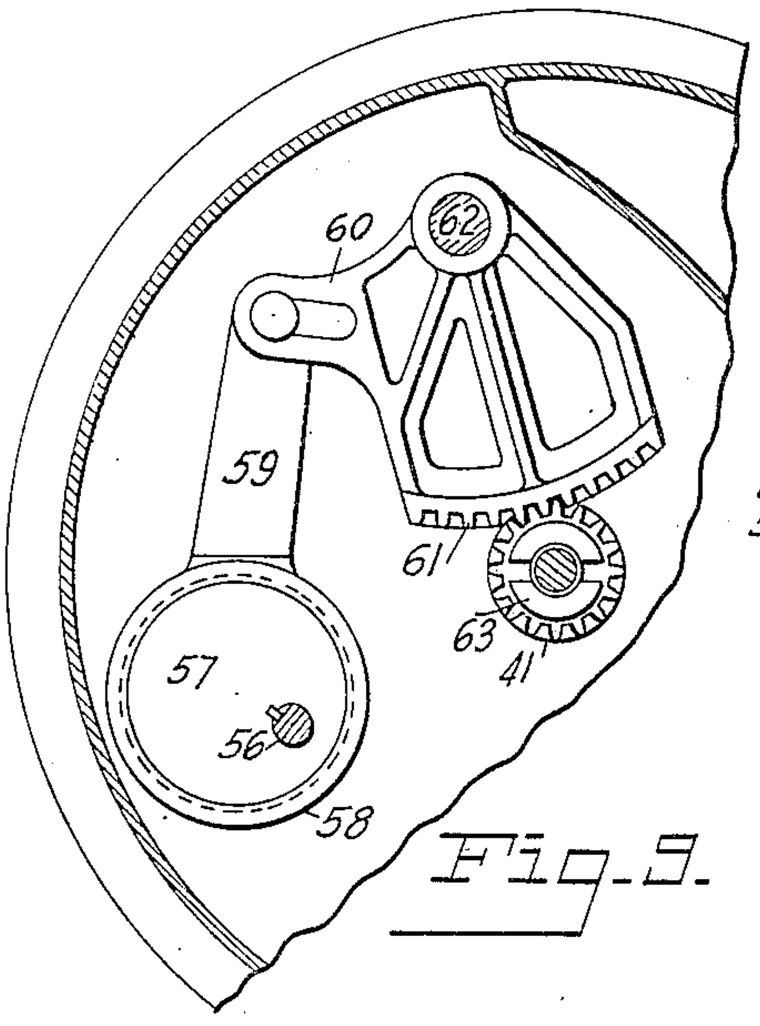

Fig. 9.

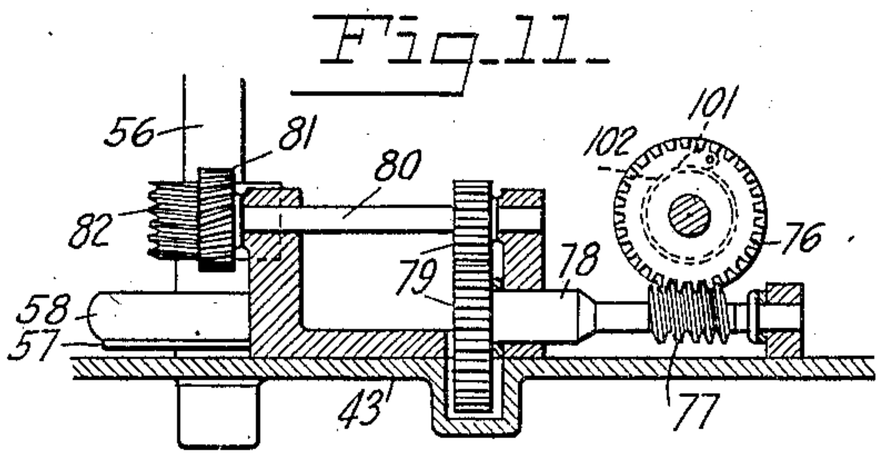

Fig. 11.

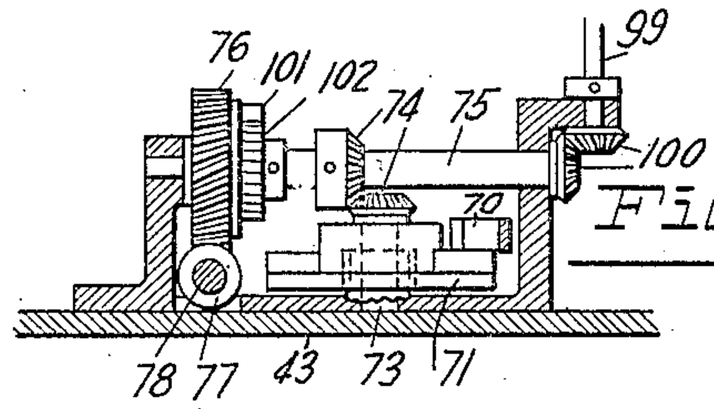

Fig. 12.

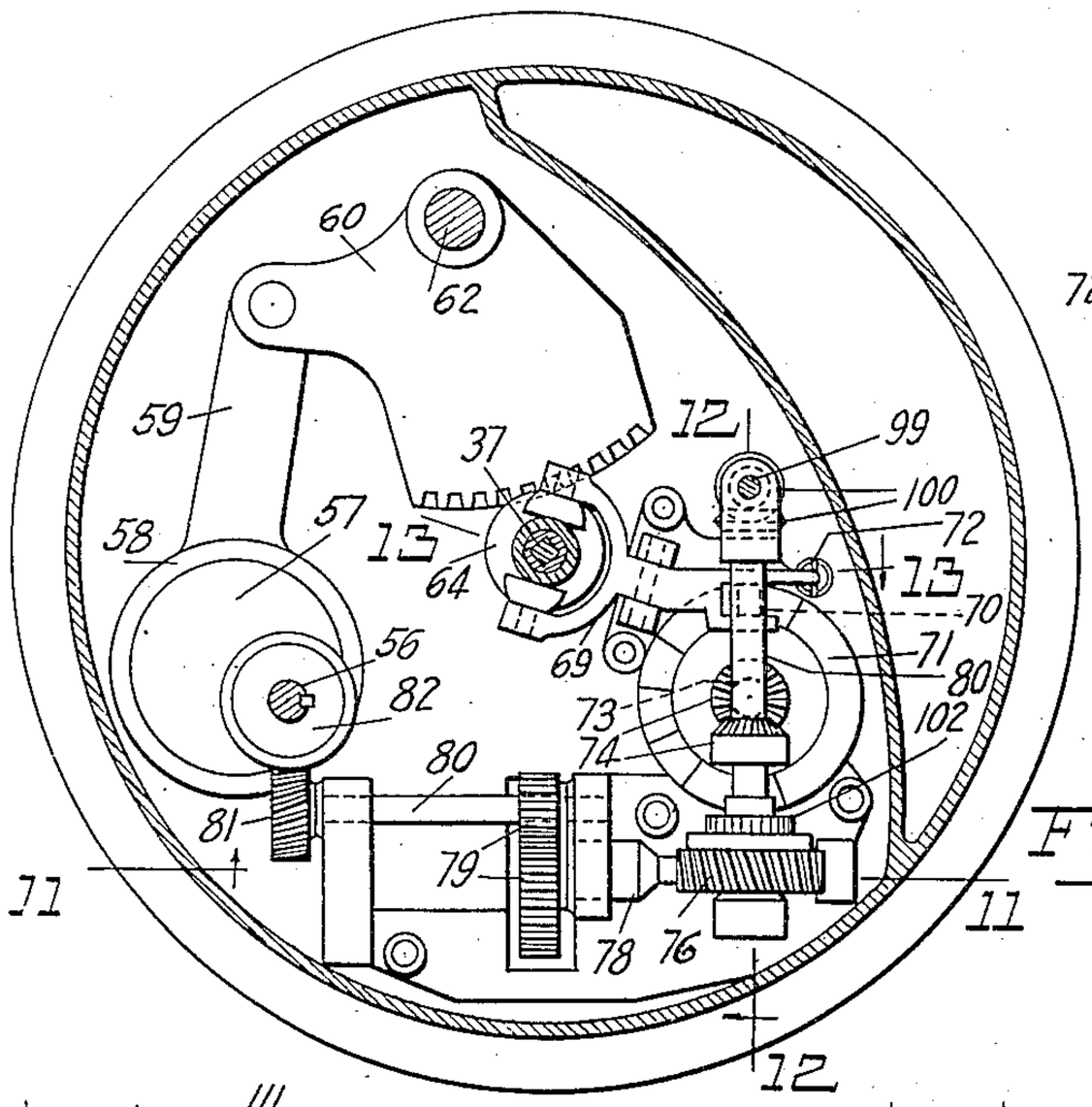

Fig. 10.

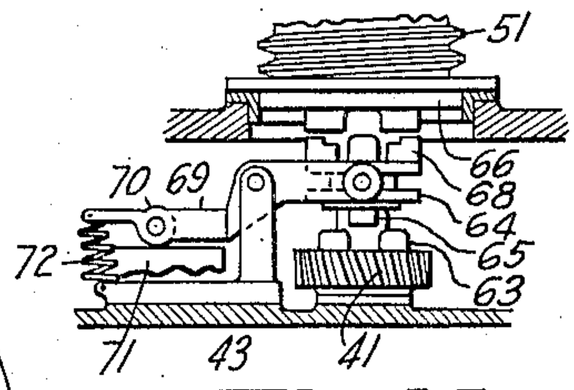

Fig. 13.

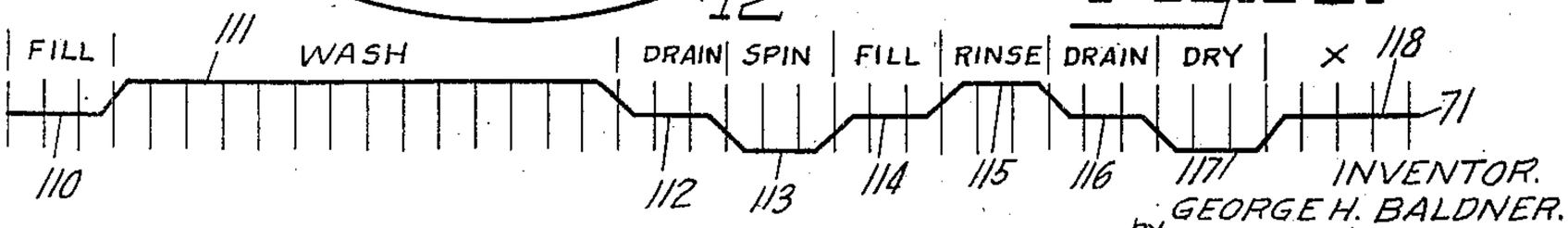

Fig. 14.

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Patented Feb. 14, 1933 1,897,414

UNITED STATES PATENT OFFICE

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CLOTHES WASHING MACHINE

Application filed November 11, 1931. Serial No. 574,313.

This invention relates to a clothes washing machine.

One object of the invention is to provide such a washing machine having improved and simplified mechanism for automatically causing the operations of washing, rinsing and drying to take place in proper sequence and to continue for the proper periods of time.

A further object of the invention is to provide such a machine in which the agitator may be operated independently of the clothes receptacle during the washing and rinsing operations and may rotate with the clothes receptacle during the water expelling operations.

A further object of the invention is to provide such a machine with improved valve mechanism for automatically controlling the delivery of water to the tub and the draining of the water therefrom.

A further object of the invention is to provide such a machine with simple and compact mechanism for operating the agitator, clothes receptacle and valve mechanism and for causing several operations to be performed in properly timed relation.

A further object of the invention is to provide such a washing machine of the pedestal type in which the operating and controlling mechanism will be located in the pedestal.

Other objects of the invention will appear as the mechanism is described in detail.

In the accompanying drawings Fig. 1 is a vertical sectional view taken centrally through a washing machine embodying my invention, with the base partly broken away; Fig. 2 is a transverse section taken on the line 2—2 of Fig. 1; Fig. 3 is a transverse section taken on the line 3—3 of Fig. 1; Fig. 4 is a plan view of the valve mechanism; Fig. 5 is a section taken on the line 5—5 of Fig. 4; Fig. 6 is a detail view of the valve showing the arrangement of the ports in the casing and in the movable valve member; Fig. 7 is a detail view of the manually operated device for adjusting the valve and the cam which controls the operating mechanism; Fig. 8 is a detail view of the knob for the manually actuated device and the dial with which it cooperates; Fig. 9 is a section taken on the line 9—9 of Fig. 1; Fig. 10 is a section taken on the line 10—10 of Fig. 1; Fig. 11 is a section taken on the line 11—11 of Fig. 10; Fig. 12 is a section taken on the line 12—12 of Fig. 10; Fig. 13 is a section taken on the line 13—13 of Fig. 10; and Fig. 14 is a lay-out of the controlling cam.

In these drawings I have illustrated one embodiment of my invention and have shown the same in connection with a washing machine of the gyrator type but it will be understood that the mechanism may take various forms and may be embodied in washing machines of various kinds.

The particular machine here illustrated comprises a tub 20 which is supported by a pedestal having a base portion 21 and an upper hollow portion 22, preferably cylindrical in form and of a diameter substantially less than the diameter of the tub. The tub is supported on the upper end of the pedestal and is here shown as having a depressed portion 23 extending into and secured to the hollow upper portion 22 of the pedestal. A clothes receptacle 24 is rotatably mounted in the tube and has its upright walls spaced therefrom and provided with perforations 25. An agitator 26 is mounted within the clothes receptacle for rotatory movement with relation thereto and for rotary movement therewith. The agitator here shown is of the gyrator type but may be of any suitable character.

The tub 20 is provided with a supporting member, here shown as a plate 27 rigidly secured to and forming a part of the bottom of the tub. Rigidly secured to the plate 27 is a tubular member the upper portion 28 of which extends into the tub and to a point near the upper end thereof, and the lower portion 29 of which extends downwardly into the pedestal. The clothes receptacle, or basket, has a plate 30 secured to and forming a part of the bottom thereof and rigidly secured to this plate, and formed integral therewith if desired, is an upwardly extending bearing member or sleeve 31 which is rotatably mounted on the upper portion 28 of the supporting member of the tub, the

arrangement being such that the clothes receptacle is free to rotate about the supporting member. The agitator comprises a base plate 32 overhanging and spaced slightly from the bottom plate 30 of the clothes receptacle and having rigidly secured thereto and, in the present instance, formed integral therewith, an upwardly extending bearing member or sleeve 33 which is rotatably mounted on the bearing member 31 for the basket. A series of radially extending blades or fins 34 are secured at their lower edges to the base plate 32 and at their vertical edges with the bearing sleeve 33 and are tapered upwardly. Rotatably mounted within the tubular portions 28 and 29 of the supporting member of the tub is a tubular shaft 35 the upper end of which is rigidly connected with the upper end of the bearing sleeve 31 of the clothes receptacle, as shown at 36. The lower part of this tubular shaft extends a suitable distance below the lower end of the tubular portion 29 of the supporting member. Rotatably mounted within the tubular shaft 35 is a shaft 37 which is connected at its upper end with the bearing sleeve 33 of the agitator. As here shown, a connecting member 38 is rigidly secured to the upper end of the shaft 37 and has a non-circular upper end portion which is seated in a correspondingly shaped socket 39 formed in the closed upper end of the bearing sleeve 33. This connection causes the agitator to move with the shaft but permits of the ready removal of the agitator when desired. The shaft 37 has a reduced lower end portion projecting below the lower end of the tubular shaft 35 and this lower end is supported in a bearing 40 formed in an oscillatory member 41 which in turn is rotatably supported in a recess 42 formed in a transverse supporting member 43 rigidly secured to the pedestal.

Power operated driving mechanism is provided for imparting the desired movements to the agitator and to the clothes receptacle through their respective shafts. In the particular construction here illustrated I have shown this driving mechanism as comprising a tubular driving shaft 44 arranged about the tubular shaft 35 and supported in bearings 45 formed in the supporting structure 46 which is arranged within the pedestal. Secured to the driving shaft 44 is a worm gear 47 which meshes with a worm 48 connected with the shaft 49 with an electric motor 50. Preferably the worm gear is connected with the shaft by a slip connection 47*a*, which may be of any suitable type. The motor as here shown is mounted in the wall of the pedestal and projects partially beyond the same. Suitable mechanism is provided for imparting oscillatory movement to the agitator and this oscillating mechanism is driven by the driving shaft 44. As here shown, a spiral gear 51 is rigidly secured to the driving shaft and meshes with a second spiral gear 52 carried by a shaft 53 which is connected by beveled gears 54 and 55 with a shaft 56 to which is rigidly secured an eccentric disk 57. Arranged about the eccentric disk 57 is an eccentric strap 58 with which is connected the end of a pitman 59. The other end of the pitman is connected with a crank arm 60 secured to a segmental toothed rack 61 pivotally mounted on a stud 62 carried by the supporting member 43. The oscillatory member 41, in which the lower end of the agitator shaft 37 is supported, is in the nature of a pinion which meshes with the toothed rack 61. This connection between the oscillating pinion 41 and the driving shaft 44 causes the pinion to be oscillated at a speed much reduced below the speed of the driving shaft, and the worm gearing which actuates the driving shaft materially reduces the speed of that shaft below the speed of the motor. Consequently the speed of oscillation of the pinion 41 is very slow as compared with the speed of the motor shaft. The oscillating member or pinion has connected therewith, and preferably formed integral with the same, a clutch member 63. A clutch member 64 is slidably mounted on the lower end of the agitator shaft 37 above the oscillating member 41 and is held against rotation with that shaft, the shaft being here shown as having a squared section on which the clutch is mounted. This clutch member has on its lower side clutch teeth 65 which are movable into and out of operative engagement with the clutch teeth 63 of the oscillating member, and thereby serves to connect the agitator shaft with the driving mechanism and cause the same to be oscillated thereby.

Means are also provided for causing the driving shaft 44 to impart rotary movement to the clothes receptacle. For this purpose a rotary member is connected with the driving shaft and is here shown as a clutch member 66 rigidly secured to the lower end of the shaft 44, and having downwardly extending clutch teeth. The lower end of the tubular shaft 35 also has a clutch member, this clutch member being in the present instance provided by forming recesses 67 in the lower end of the tubular member. The clutch member 64 has on its upper side clutch teeth 68 arranged to engage both the clutch 66 and the clutch 67 and thereby connect the driving shaft directly with the tubular shaft, thus causing the clothes receptacle to rotate at a relatively high speed, or to spin in the tub. Preferably the teeth 68 of the clutch member 64 are so arranged that they will engage with the clutch 66 before they engage with the clutch 67, thereby causing the driving shaft to pick up its load gradually. When the clothes receptacle is rotated the agitator must rotate therewith. This may be accomplished by

merely disconnecting the agitator from its driving mechanism and permitting the same to be dragged along by the clothes in the receptacle but I prefer to positively rotate the agitator along with the clothes receptacle and this is accomplished by holding the clutch member 64 at all times against rotation with relation to the agitator shaft 37. Consequently when the clutch member 64 is in engagement with the clutch members 66 and 67 the driving shaft, tubular shaft and the agitator shaft will rotate in unison, and when the clutch member 64 is in engagement with the clutch member of the oscillating pinion the agitator shaft will be oscillated but the tubular shaft will remain stationary.

The position of the clutch member 64 and consequently the connections between the agitator shaft and the clothes receptacle shaft and the driving mechanism is controlled by suitable timing mechanism which will cause the clutch member to be shifted at predetermined intervals. As here shown, a shifting yoke 69 is connected with the clutch member 64 in the usual manner and is pivotally mounted between its ends and has near its outer end a part, such as a roller 70, which engages a cam 71, the roller being held in engagement with the cam by a spring 72. The timing mechanism, or controlling cam, may be actuated in any suitable manner but preferably it is driven from the driving mechanism and, as here shown, the cam 71, see Fig. 12, is a face cam and is carried by a vertical shaft 73 and this shaft is connected by beveled gears 74 with a shaft 75 with which is connected a worm gear 76 meshing with a worm 77 on a shaft 78. The shaft 78 is connected by reducing gears 79 with a shaft 80 to which is secured a spiral gear 81 which meshes with a spiral gear 82 on the shaft 56 which forms part of the actuating mechanism for the oscillating device. This driving connection is of such a character as to so reduce the speed of operation of the cam that it will rotate very slowly. With the gear ratios established in the present machine the cam will make a single rotation in approximately thirty-eight minutes when driven from a motor having 1725 R. P. M.

Suitable conduits are connected with the tub for delivering water thereto and draining water therefrom and automatically controlled valve mechanism is interposed between these conduits and the tub to control the filling and emptying of the tub. As here shown, there are two supply conduits, the conduit 83 being adapted for connection with a source of supply for hot water and the conduit 84 being adapted for connection with a supply of cold water. A discharge conduit 85 is adapted for connection with a drain and has a branch 86 adapted to be separately connected with the tub. It will be obvious, however, that any suitable number of supply and drain conduits may be employed. The valve mechanism comprises a valve casing, the lower part 87 of which is, in the present instance, formed integral with the several conduits and has formed therein ports 88, 89, 90 and 91, communicating respectively with the conduits 83, 85, 84 and 86. The upper part 92 of the casing is connected by a conduit 93 with a filling and discharge opening 94 in the bottom of the tub. In the arrangement here shown the lower member 87 of the valve casing is provided with a flat smooth face through which the several ports extend and a valve member 95, preferably in the form of a disk, is rotatably mounted on the flat face of the casing member 87 and is held firmly in engagement therewith by a spring 96. This valve member 95 has a single port 97 so arranged that when the valve member is rotated it will be moved successively into line with the several ports in the valve casing, thereby alternately connecting the tub with the source of water supply and the drain. The rotatable valve member 95 is carried by a stem 98 which extends through and is rotatably supported in the lower casing member 87 and is connected with a shaft 99 operated by the driving mechanism in timed relation to the cam 71 and here shown as connected to the shaft 75 by beveled gears 100.

It is desirable that the controlling cam and the valve should be adjustable and to enable this to be done I have interposed between the cam and the driving mechanism an overruning clutch. As here shown, see Figs. 11 and 12, the worm gear 76 is loosely mounted on the shaft 75, and carries a pawl 101 which engages a ratchet wheel 102 rigidly secured to the shaft 75, so that the rotation of the worm gear 76 will be imparted to the shaft but the shaft may be rotated forwardly with relation to the worm gear. A manually operated device is preferably connected with the driving mechanism for the valve between the latter and the cam and, as here shown, a beveled gear 103 is secured to the stem 98 of the valve member 95 and meshes with a beveled gear 104 which is connected by a flexible shaft 105 with a knob 106 mounted on the outer wall of the pedestal and having a pointer 107 arranged to travel over a dial 108 which is graduated and marked to indicate the successive operations of the mechanism. The knob 106 not only serves to rotate the cam and the valve member independently of the driving mechanism but it moves with the cam and valve member when these parts are actuated by the driving mechanism and thus serves to indicate at all times the position of the cam and the status of the operations.

The switch which controls the operation of the motor 50 is preferably so connected with the cam that it will be opened when the several operations are completed. As shown in Fig. 7 this switch is connected with the

knob 106 of the manually actuated device, as shown at 109, and is so arranged that when the knob is moved to its initial position the switch will be closed and when the knob has completed its movement the switch will be opened.

In Fig. 14 I have shown a lay-out of the controlling cam with legends associated with the various parts thereof, that is, legends corresponding with the legends associated with the dial in Fig. 8. When the motor has been started, either by the operation of the knob 106 or otherwise, the knob is moved to the position shown in Fig. 8 and the clutch operating roller is in contact with the part 110 of the cam, as shown in Fig. 14. This part of the cam is of intermediate height and serves to hold the clutch member 64 in a neutral position, in which position the driving mechanism is disconnected from both the agitator shaft and the clothes receptacle shaft. The movement of the knob to this position has actuated the valve mechanism to establish the connection between the tub and the source of supply for hot water and the tub is filled while the controlling roller is traveling over the part 110 of the cam. As the movement of the cam continues the roller passes from the part 110 to a higher portion 111 of the cam which lifts the roller and moves the clutch member 64 into engagement with the clutch member 63 of the oscillating device and at approximately the same time the valve closes the connection between the tub and the water supply. The part 111 of the cam is relatively long and the agitator is thus oscillated within the clothes receptacle for a period of time sufficient to thoroughly wash the clothes. At the end of this washing period the roller passes from the part 111 of the cam to an intermediate part 112 which again moves the clutch to a neutral position, and at approximately the same time that the clutch is shifted the valve mechanism establishes connection between the tub and the drain conduit 85, this connection being established through the port 89. After an interval sufficient to permit the tub to drain the controlling roller moves into engagement with a depressed portion 113 of the cam which causes the clutch member 64 to be moved into engagement with the clutch members 66 and 67, thereby causing the clothes receptacle and agitator to rotate at a relatively high speed to expel the water from the clothes by centrifugal force. At the end of the water expelling or drying operation the controlling roller again moves to a neutral part 114 of the cam and the valve mechanism opens the port 90 to connect the tub with the source of supply of cold water, through the conduit 84. When the tub has been filled with rinse water the controlling roller moves into engagement with another elevated portion 115 of the cam and the clutch again connects the oscillating device with the agitator shaft, thereby causing the agitator to move the clothes through the rinse water and thoroughly rinse the same. At the end of the rinsing operation the controlling roller again moves into engagement with an intermediate portion, 116, of the cam and the tub is connected with the drain, this time through the port 91 and branch 86. When the rinse water has been discharged the valve is closed and the controlling roller engages a depressed portion 117 of the cam again shifting the clutch to connect the driving mechanism with the clothes receptacle and agitator and causing the receptacle to spin to expel the water from the clothes and partially dry the same. The extent of the drying is, of course, dependent upon the length of the spinning operation. At the end of the spinning operation the controlling roller again engages a neutral portion 118 of the cam and moves the clutch to its neutral position. The port in the movable valve member has now moved past the last port in the valve casing and the valve remains closed. The movement of the cam to bring the last mentioned portion 118 thereof into engagement with the roller also causes the switch 109 to be moved to its open position, thereby stopping the motor. This leaves the clutch in its neutral position and the pointer 107 on knob 106 in a position just to the left of the position in which it is shown in Fig. 8. When the knob is again moved to the position shown in Fig. 8 the motor switch is closed and the above mentioned cycle of operations is repeated. If the operator wishes to omit or shorten any of the periods of operation this can be accomplished by advancing the cam and valve mechanism with relation to the driving mechanism.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, means for oscillating said agitator in said clothes receptacle, means for rotating said clothes receptacle, power operated driving mechanism, and means operated in timed relation to said driving mechanism to cause said oscillating means to impart oscillatory movement to said agitator, to interrupt the oscillating movement of said agitator and to cause said rotating means to impart rotary movement to said clothes receptacle.

2. In a clothes washing machine, a tub,

a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, means for oscillating said agitator in said clothes receptacle, means for rotating said clothes receptacle, power operated driving mechanism, and means controlled by said driving mechanism for causing said agitator to be actuated by said oscillating means, for interrupting the operation of said agitator by said oscillating means and for subsequently causing said clothes receptacle to be rotated by said rotating means.

3. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, means for oscillating said agitator in said clothes receptacle, means for rotating said clothes receptacle, power operated driving mechanism, and means controlled by said driving mechanism for causing said agitator to be actuated by said oscillating means, for interrupting the operation of said agitator by said oscillating means and subsequently causing said clothes receptacle and said agitator to be rotated simultaneously by said rotating means.

4. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, separate shafts connected respectively with said agitator and said clothes receptacle, power operated driving mechanism, means for operatively connecting said driving mechanism with said shafts, and means operated in timed relation to said driving mechanism for controlling the connections between said driving mechanism and said shafts.

5. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, separate shafts connected respectively with said agitator and said clothes receptacle, power operated driving mechanism, means for operatively connecting said driving mechanism with said shafts, and means operated by said driving mechanism for controlling the connections between said driving mechanism and said shafts.

6. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, separate shafts connected respectively with said agitator and said clothes receptacle, power operated mechanism, means driven by said driving mechanism for oscillating the agitator shaft, means driven by said driving mechanism for rotating both of said shafts, and means controlled by said driving mechanism to connect said oscillating means with said agitator shaft, to subsequently disconnect said oscillating means from said agitator shaft and to connect said rotating means with both shafts.

7. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, a tubular shaft connected with said clothes receptacle, a shaft rotatable within said tubular shaft and connected with said agitator, power operated driving mechanism, an oscillatory device driven by said driving mechanism, a rotary device driven by said driving mechanism, means for connecting said oscillating device with said agitator shaft and for connecting said rotary device with said tubular shaft, and a timing device to control said connections.

8. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, a tubular shaft connected with said clothes receptacle and having a clutch member, a shaft rotatably mounted within said tubular shaft and connected with said agitator, power operated driving mechanism, a rotatable clutch member driven by said driving mechanism, an oscillatory clutch member driven by said driving mechanism, an axially movable clutch member connected with said agitator shaft for rotation therewith and having means for connecting the same with said oscillatory clutch member when it is in one position and for connecting it with said rotatable clutch member and the clutch member of said tubular shaft when it is in another position, and a timing mechanism to control the position of said axially movable clutch member.

9. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, a tubular shaft connected with said clothes receptacle, a shaft rotatable within said tubular shaft and connected with said agitator, a driving member rotatable about the axis of said tubular shaft, means for rotating said driving member, an oscillating device driven by said driving member, timing mechanism, and means controlled by said timing mechanism to connect said oscillating device with said agitator shaft, to disconnect said device from said agitator shaft and to subsequently connect said driving member with said tubular shaft and said agitator shaft and cause both shafts to be rotated.

10. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, a tubular shaft connected with said clothes receptacle, a shaft rotatable within said tubular shaft and connected with said agitator, and projecting below said tubular shaft, a driving gear rotatable about said tubular shaft, means for rotating said driving gear, said gear and said tubular shaft having adjacent clutch members, a clutch member mounted at the lower end of said agitator shaft, means driven by said gear to impart oscillatory movement to the last mentioned clutch member, a clutch member mounted for axial movement on said agitator shaft, held against rotation with relation thereto and having means for operatively connecting the same with said oscillatory clutch member when it is in its lower position and to operatively connect it with the clutch members of said driving gear and said tubular shaft when it is in its upper position, and means operated in timed relation to said gear to control the position of said axially movable clutch member.

11. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, a tubular shaft connected with said clothes receptacle, a shaft rotatable within said tubular shaft and connected with said agitator, a tubular driving shaft rotatably mounted about the first mentioned shafts, a motor having geared connection with said driving shaft, an oscillatable member, means driven by said driving shaft to impart oscillatory movement to said member, a movable connecting device having means for connecting said oscillatable member with said agitator shaft when said device is in one position and for connecting said driving shaft directly with the clothes receptacle shaft when said device is in another position, and means driven by said motor to actuate said connecting device at predetermined intervals.

12. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, a tubular shaft connected with said clothes receptacle, a shaft rotatable within said tubular shaft and connected with said agitator, a tubular driving shaft rotatably mounted about the first mentioned shafts, a motor having geared connection with said driving shaft, an oscillatable member, means driven by said driving shaft to impart oscillatory movement to said member, a movable connecting device having means for connecting said oscillatable member with said agitator shaft when said device is in one position and for connecting said driving shaft directly with the clothes receptacle shaft when said device is in another position, a cam driven by said motor, and means actuated by said cam to operate said connecting device at predetermined intervals.

13. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, water supply and drain conduits connected with said tub, power operated driving mechanism, instrumentalities actuated by said driving mechanism to oscillate said agitator in said clothes receptacle, to cause the wash water to be discharged from said tub, to cause rinse water to be delivered to said tub, to again oscillate said agitator, to cause the rinse water to be discharged from said tub, and to rotate said clothes receptacle, and a timing device to control the sequence of said operations and the duration of said oscillating and rotating operations.

14. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, water supply and drain conduits connected with said tub, power operated driving mechanism, instrumentalities actuated by said driving mechanism to oscillate said agitator in said clothes receptacle, to cause the wash water to be discharged from said tub, to cause rinse water to be delivered to said tub, to again oscillate said agitator, to cause the rinse water to be discharged from said tub, and to rotate said clothes receptacle, and means actuated by said driving mechanism and including a cam to control the sequence of said operations and the duration of said oscillating and rotating operations.

15. In a clothes washing machine, a tub, a perforated clothes receptacle, rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, water supply and drain conduits connected with said tub, valve mechanism to control the flow of water through said conduits, power operated driving mechanism, instrumentalities driven by said driving mechanism to actuate said valve mechanism, to oscillate said agitator and to rotate said clothes receptacle and said agitator, and means actuated by said driving mechanism to control the sequence in which said instrumentalities operate.

16. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, water supply and drain conduits connected with said tub, valve mech-

anism to control the flow of water through said conduits, power operated driving mechanism, instrumentalities driven by said driving mechanism to actuate said valve mechanism, to oscillate said agitator and to rotate said clothes receptacle and said agitator, a timing mechanism to cause said instrumentalities to operate in such sequence that when said driving mechanism is started in operation wash water will be delivered to said tub, the agitator then oscillated to wash the clothes, the wash water then discharged, the clothes receptacle and agitator then rotated to expel the water from said clothes, rinse water then delivered to said tub, the agitator then oscillated to rinse the clothes, the rinse water then discharged, and the clothes receptacle and agitator then rotated to expel the water from said clothes.

17. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, water supply and drain conduits connected with said tub, valve mechanism to control the flow of water through said conduits, power operated driving mechanism, a rotatable member driven by said driving mechanism at a relatively high speed, an oscillatory member driven by said driving member at a relatively low speed, means for connecting said oscillatory member with said agitator or connecting said rotatable member with said clothes receptacle and said agitator, a cam to control said connections, and means driven by said driving mechanism to actuate said cam and said valve mechanism in timed relation one to the other.

18. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, water supply and drain conduits connected with said tub, valve mechanism to control the flow of water through said conduits, a tubular shaft connected with said clothes receptacle, a shaft rotatably mounted in said tubular shaft, a driving gear mounted about said tubular shaft for rotation with relation thereto, a motor operatively connected with said gear, an oscillatory member, means driven by said gear to impart oscillatory movement to said member, a connecting device movable to one position to connect said oscillatory member with said agitator shaft and movable to another position to connect said driving gear with said tubular shaft, means including a cam for operating the connecting device, and means driven by said gear for actuating said cam and said valve mechanism.

19. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, water supply and drain conduits connected with said tub, valve mechanism to control the flow of water through said conduits, a tubular shaft connected with said clothes receptacle, a shaft rotatably mounted in said tubular shaft, a driving gear mounted about said tubular shaft for rotation with relation thereto, a motor operatively connected with said gear, an oscillatory member, means driven by said gear to impart oscillatory movement to said member, a connecting device movable to one position to connect said oscillatory member with said agitator shaft and movable to another position to connect said driving gear with said tubular shaft, means including a cam for operating said connecting device, and means driven by said gear for actuating said cam and said valve mechanism, and manually operated means to adjust said cam and said valve mechanism with relation to said driving gear.

20. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle for rotatory movement with relation thereto, water supply and drain conduits connected with said tub, valve mechanism to control the flow of water through said conduits, a tubular shaft connected with said clothes receptacle, a shaft rotatably mounted in said tubular shaft, a driving gear mounted about said tubular shaft for rotation with relation thereto, a motor operatively connected with said gear, an oscillatory member, means driven by said gear to impart oscillatory movement to said member, a connecting device movable to one position to connect said oscillatory member with said agitator shaft and movable to another position to connect said driving gear with said tubular shaft, means including a cam for operating a connecting device, means driven by said gear for actuating said cam and said valve mechanism, an overrunning clutch interposed between said driving gear and said cam, a valve mechanism, and a manually operated actuating device connected with said cam and said valve mechanism.

21. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle, power operated driving mechanism, a rotary member driven by said driving mechanism, an oscillating member, means driven by said driving mechanism to impart oscillating movement to said oscillatory member, means to cause said oscillatory member to actuate said agitator or to cause said rotary member to actuate said clothes receptacle, means including a cam for operating said controlling means, at predetermined intervals, a plurality of conduits leading to and from said tub, a valve inter-

posed between said conduits and said tub and comprising a casing having a series of ports connected with the respective conduits and a valve member having the port movable into line with the ports in said casing successively, and means driven by said driving mechanism for actuating said cam and said valve member in timed relation one to the other.

22. In a clothes washing machine, a tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle, power operated driving mechanism, a rotary member driven by said driving mechanism, an oscillating member, means driven by said driving mechanism to impart oscillating movement to said oscillatory member, means to cause said oscillatory member to actuate said agitator or to cause said rotary member to actuate said clothes receptacle, means including a cam for operating said controlling means at predetermined intervals, a plurality of conduits leading to and from said tub, a valve interposed between said conduits and said tub and comprising a casing having a series of ports connected with the respective conduits and a valve member having the port movable into line with the ports in said casing successively, and means driven by said driving mechanism for actuating said cam and said valve member in timed relation one to the other, said cam having means to hold said controlling means in a neutral position when the port in said valve member is in line with any one of the ports in said casing.

23. In a clothes washing machine, a tub, a pedestal supporting said tub and having a hollow upper portion of a diameter substantially less than the diameter of said tub, a perforated clothes receptacle rotatably mounted in said tub, an agitator mounted in said clothes receptacle, a tubular shaft connected with said clothes receptacle and extending into said pedestal, a shaft rotatably mounted in said tubular shaft, extending below the same and having its upper end connected with said agitator, a motor operating mechanism mounted within said pedestal and comprising a rotary member driven by said motor, an oscillating member, means driven by said motor to actuate said oscillating member, means selectively operable to connect said oscillating member with said agitator shaft or to connect said rotary member with said tubular shaft, and means controlled by said motor to control the operation of said connecting means.

In testimony whereof, I affix my signature hereto.

GEORGE H. BALDNER.